

NetLets: Mechanisms for Measurement-Based End-to-End Performance

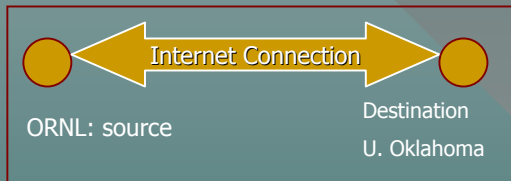


Currently, no control once data reaches the network

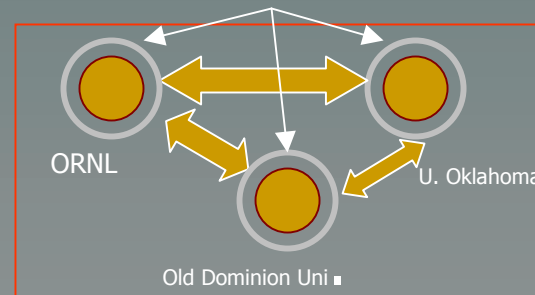


Netlets collect measurements, compute optimal paths and route

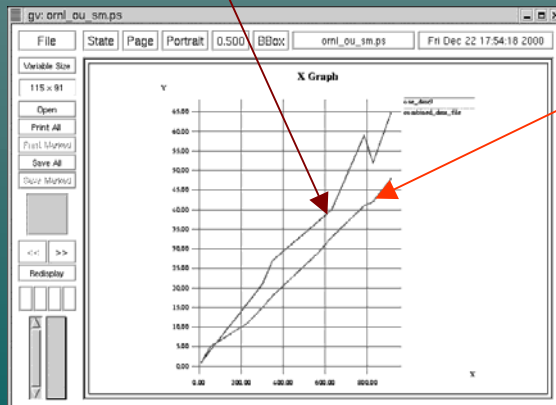
Internet Measurements



NetLets at host nodes

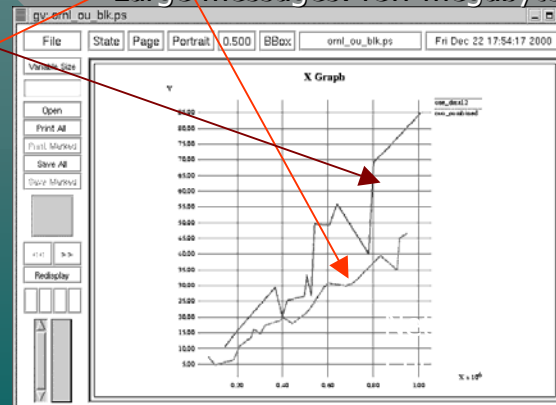


Small messages: few bytes



X-axis: number of messages

Large messages: few megabytes



X-axis: message sizes

Objective:

End-to-end delay minimization for ORNL-OU

Solution:

Two-paths via NetLets:

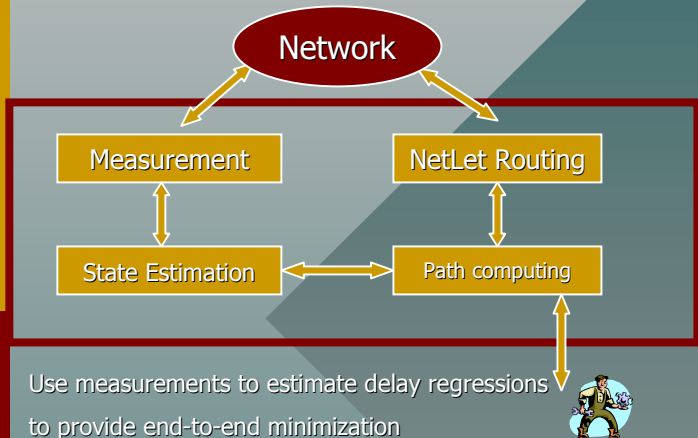
ORNL-OU, ORNL-ODU-OU

Average reduction in end-to-end delay

is about 20-30%

These results a a combination of :
statistical estimation,
graph and flow algorithms, and
network engineering

NetLet Daemons: Implemented on top of TCP/IP stack



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Network Modeling and
Simulation Program

Theory helped implementation:

1. Appropriate measurements and their optimization
2. Performance savings are real

Performance Guarantees: End-to-End delay

Method:

Regression based on delay measurements,
followed by path computation

Given only measurements of sufficient (finite) size
Performance guarantee:

$$P\left\{\left[T(\hat{P}_R, R) - T(P_R^*, R)\right] > \varepsilon\right\} < \delta$$

irrespective of the joint delay distributions

Informally, end-to-end delay of computed path is within specified
tolerance of optimal with a specified probability

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